



FIGURE 5.1. Diagram of the human brain showing the right hemisphere, and particularly the location of the striatum, globus pallidus, and thalamus. Most of the left hemisphere has been cut away up to the prefrontal lobes to reveal the striatum and other midbrain structures. Adapted with permission from an illustration by Carol Donner from page 53 of the article by M. B. H. Youdin & P. Riederer (1997). Understanding Parkinson's disease. *Scientific American*, 276 (January), pp. 52–59. Copyright by *Scientific American*, 415 Madison Avenue, New York, NY 10017-1111.

one of three dopamine branches identified in the brain. Low functioning in a mesolimbic pathway in the brain produces an altered sensitivity to reinforcement and deficient extinction of previously reinforced behavior, which could give rise to the delay aversion, hyperactivity, impulsivity, and poor sustained attention. Low functioning in the mesocortical dopamine pathway could also give rise to deficient attention toward a target, as well as to poor planning and executive functioning. Finally, low functioning in the nigral-striatal dopamine pathway results in impaired modulation of motor behavior and deficient learning and memory, which could give rise to the motor delay, clumsiness, and poor motor inhibition seen in ADHD. Predispositions to low functioning in these dopamine pathways are hypothesized to interact with each other and with surrounding environmental factors to amplify or alter these initial predispositions. The theory provides a more comprehensive explanation of symptoms and deficits associated with ADHD (see Chapters 2 and 3), while generating some testable hypotheses concerning which of these should be associated with hypofunctioning in particular pathways. Future research is clearly in order

before this innovative attempt to account for ADHD via these neurotransmitter pathways can be properly evaluated, however,

Pregnancy and Birth Complications

Pregnancy and birth complications are of interest to researchers in ADHD because they can have a detrimental effect on brain development. Some studies have not found a greater incidence of such complications in children with ADHD than in nondisabled children (Barkley, DuPaul, & McMurray, 1990). But others clearly have. For instance, Claycomb, Ryan, Miller, and Schnakenberg-Ott (2004) found that mother's age at delivery (younger), educational level (lower), time between onset of labor and birth (longer), and presence of delivery complications accounted for 42% of the variance in ADHD. The study, however, did not control for maternal ADHD symptoms, which may have resulted in the younger age at delivery and lower educational level of the mothers. The latter maternal characteristics may simply be markers for maternal ADHD, and so may explain their being associated with the children's ADHD.

Others have found evidence of undistress, for example, eclampsia (Minde, Webb, & Chen (1981) associated with inattentive school adjustment subsequently (Schothorst & 1997; Szatmari, 1993). that might be and ADHD. ADHD, so Mick, Biederman (2002) to be three with ADHD accounting for It is not merely pose the risk disorder itself (orders), but malities due to chymal lesions (Whittaker, 1997).

In one v (2003) stud butions to / (MZ) twins fected by A contributor cordance ra study might pairs in whi was precise initially scr were eventu discordant the authors would be r tions (a no discordance the affected likely to ha

Several studies have shown that children with younger age at onset of seizures, and children, at greater risk of developing epilepsy (2004; Den Hartsoogh 1968). Bec